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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,591	03/27/2006	Ben Paul Karl Van Hove	VANH3003JEK	7709
23364 7590 05/22/2009 BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314-1176				
EXAMINER				
WU, IVES J				
ART UNIT		PAPER NUMBER		
1797				
MAIL DATE		DELIVERY MODE		
05/22/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/573,591

**Applicant(s)**

VAN HOVE, BEN PAUL KARL

**Examiner**

IVES WU

**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 15-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SE-08)  
Paper No(s)/Mail Date 3/27/2008
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

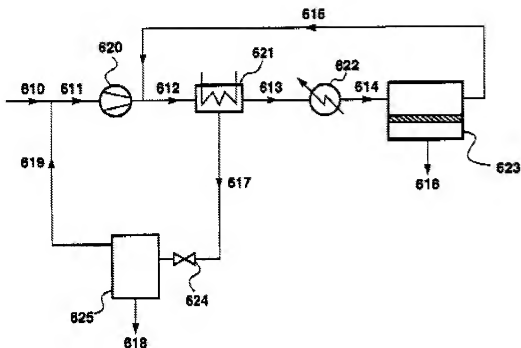
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(1). **Claims 15-17, 20, 22, 24-26, 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al (US 5755855A) in view of Wachsmuth (US 3225517).

As to method for separating gases from a gas mixture wherein the gas mixture to be treated is passed through a membrane separator by means of compressor installation in **independent claim 15**, Baker et al (US 5755855A) disclose separation process condensation, membrane separation and flash evaporation (Title). A process is for separating two low-boiling components of a gas-phase mixture (Abstract, line 1-2). It is shown in the following Figure. It contains compressor 620, condenser 621, heater 622, membrane unit 623.

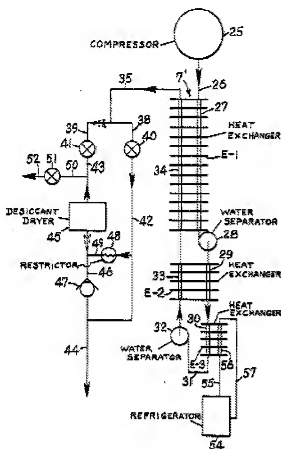


**FIG. 6**

As to the compressed gas mixture to be treated being cooled at least in the compressor installation to separate condensate from the gas mixture, after which as the compressed gas mixture leaving the compressor installation, the compressed gas mixture to be re-heated before it is passed through membrane separator in **independent claim 15**, as shown in the Figure above which illustrate the process as claimed.

As to step of reheating comprising using recuperation heat of the compressor installation that generates heat available for recuperation heating in independent claim 15, Baker et al (US 5755855A) disclose heater 622. Baker et al **do not teach** reheating by recuperation heat of compressor as claimed.

FIG. 2.



Therefore, it would have been obvious at time of the invention to install the refrigerative type heat exchanger of Washmuth for the heater of Baker et al by circulating the stream 613 in indirect contact with stream 612 as shown in the Figure 6 above in order to acquire the advantage cited in preceding paragraph.

As to during the reheating step, use being made of the heat of the compressed gas mixture at exit of a compressor element of the compressor installation in **claim 16**, as shown in the Figure 2 disclosed by Wachsmuth (US 3225517), it reads on the limitations as claimed.

As to during the reheating step, use being made of a recuperation which is drawn from the compressed gas mixture to be treated while carry out cooling step in **claim 17**, as shown in the Figure 6 disclosed by Baker et al (US 5755855A), the gas to be treated – stream 613 which is carried out in cooling step 621.

As to after cooling of the gas mixture, the gas mixture to be passed through a dryer in **claim 20**, dryer being a cooling type dryer in **claim 22**, As shown in the Figure 2 disclosed by Wachsmuth (US 3225517), water separator 32 and refrigerator 54 which read on limitations as claimed.

As to device for separating gases from a gas mixture comprising a compressor installation having inlet and outlet for a gas mixture to be treated; a membrane separator whose entry is connected to the outlet via supply line; a radiator in the supply line through which the gas mixture to be treated flows and radiator comprising a heat exchanger included in the compressor installation in **independent claim 24**, the disclosure of Baker et al, Wachsmuth is incorporated herein by reference, the most subject matters of compressor, membrane, radiator (heat exchanger) and supply line as currently claimed, have been recited in Applicant's claim 15 and have been discussed therein with Figure 6 of Baker et al (US 5755855) to further illustrate the configuration.

As to heat exchanger to be incorporated in a compressed air line between the exit of a compressor element and the exit of the compressor installation in **claim 25**, the disclosure of Baker et al, Wachsmuth is incorporated herein by reference, the most subject matter of location of heat exchanger as currently claimed, have been recited in Applicant's claims 16 and 17 which imply the limitations as currently claimed, and have been discussed therein.

As to heat exchanger being a cooler comprising a cooling type dryer of the compressor installation in **claim 26**, the water separator 29, 32 disclosed in the Figure 2 of Wachsmuth (US 3225517) would meet the limitations as claimed.

As to compressor installation including at least one cooling circuit and wherein the heat exchanger in the supply line to the membrane separator comprising part of the cooling circuit in

**claim 28**, the disclosure of Baker et al, Wachsmuth is incorporated herein by reference, the combined teaching will have the setting wherein the heat exchanger in the supply line to the membrane separator comprising part of the cooling circuit as claimed.

(2). **Claims 18, 19 and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al (US 5755855A) in view of Wachsmuth (US 3225517), further in view of Casey (US 4582121).

As to compressor installation comprising a compressor element with liquid injection whose injected liquid is separated in a heated slate at exit of the compressor element by a liquid separator comprising during the reheating step, using the heat of the separated liquid to re-heat the gas mixture in **claim 18**, Baker et al, Wachsmuth **do not teach** injection of liquid at exit of compressor in a heated slate for heat transfer as claimed.

However, Casey (US 4582121) **teaches** apparatus for and method of heat transfer (Title). A heat transfer working medium (e.g., a volatile liquid) is enclosed within the container and is capable of being efficiently vaporized on the surface of the heat source, being conveyed to the heat absorber, being condensed thereon, and being returned to the heat source (Abstract, line 3-8). The working fluid used in a heat pipe is the actual heat transfer medium (Col. 2, line 51-52). Although Casey (US 4582121) does not teach the heated slate for injected liquid in a liquid separator at exit of compressor, it would be obvious to install the heat transfer working medium apparatus of Casey in the E-1 heat exchanger of Wachsmuth because of design choice. MPEP §§ 2144.04.

The advantage of working medium is to transfer heat isothermally (Abstract, line 1).

Therefore, it would have been obvious at time of the invention to install the working medium apparatus for heat transfer disclosed by Casey for the E-1 heat exchanger of Wachsmuth at exit of compressor with injection liquid separated by the heated slate, then replace the heater 622 in the membrane separation process of Baker et al with apparatus of Casey in order to attain the advantage cited herein above.

As to a cooling medium in a cooler for cooling the compressed gas mixture to be heated by compressed gas mixture and thereby contains heat available for recuperation heating comprising using recuperation heat of the cooling medium during the reheating step in **claim 19**,

the disclosure of Baker et al, Wachsmuth, Casey is incorporated herein by reference. The most subject matter of cooling medium for heat transfer in heat exchanger as currently claimed, has been recited in Applicant's claim 18 as liquid, and has been discussed therein.

As to compressor installation comprising a compressor element with liquid injection and a liquid separator incorporated in a compressed air line located at exit of the compressor element, exit being connected to the liquid injection system via a return line, and wherein the heat exchanger is incorporated in return line in **claim 27**, the disclosure of Baker et al, Wachsmuth, Casey is incorporated herein by reference. The most subject matter of liquid injection, liquid separator, exit of compressor element as currently claimed, have been recited in Applicant's claim 18, and have been discussed therein. It would be obvious to have the exit of compressor being connected to the liquid injection system via a return line, and wherein the heat exchanger is incorporated in return line in view of the configuration of working medium between heat source and heat sink disclosed by Casey (US 4582121).

(3). **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al (US 5755855A) in view of Wachsmuth (US 3225517), further in view of Ramsey, Jr. (US 5048548).

As to dryer using a desiccant in **claim 21**, Baker et al, Wachsmuth **do not teach** a desiccant dryer after the cooling as claimed.

However, Ramsey, Jr. (US 5048548) **teach** vapor control system (Title). A water separator or desiccant dryer 22 is used to remove water from the condensate being delivered from trough 20 via line 24 (Col. 4, line 66).

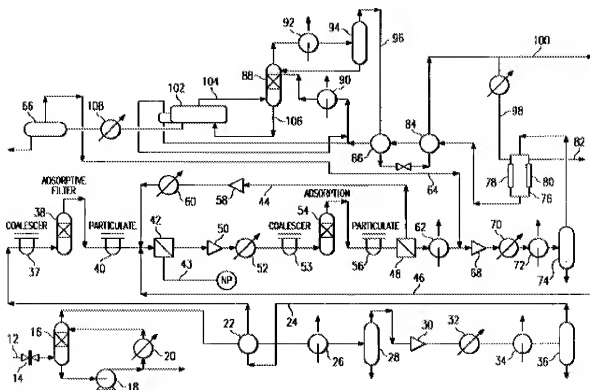
In view of recognizable functional equivalent dryers such as desiccant dryer, water separator disclosed by Ramsey, Jr., it would have been obvious at time of the invention to use a desiccant dryer for the water separator disclosed by Wachsmuth based on their interchangeability as recognized functional equivalence as dryer in water removal.

(4). **Claim 23** is rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al (US 5755855A) in view of Wachsmuth (US 3225517), further in view of Daus et al (US 6085549A).



As to after cooling the gas mixture, the gas mixture being passed through a filter or through a set of filters and adsorption elements in **claim 23**, Baker et al, Wachsmuth **do not teach** filter or through a set of filters and adsorption elements as claimed.

However, Daus et al (US 6085549A) **teach** membrane process for producing carbon dioxide (Title).as shown in the Figure below, it contains a coalescer, adsorptive filter and particulate filter after the heat exchanger 22.



The advantages of these filters are to remove contaminants in aerosol, particles as well known in the art.

Therefore, it would have been obvious at time of the invention to install these filters of Daus in the membrane separation process after the condenser 20 disclosed by Baker et al in order to achieve the advantages cited herein above.

### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu  
Art Unit: 1797  
Date: May 20, 2009

/DUANE SMITH/  
Supervisory Patent Examiner, Art Unit 1797